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PHARMACOTHERAPEUTIC PURSUANCE AND REHILIBATION OF THE PATIENTS ADMITTED TO THE INTERNAL MEDICINE SERVICE OF THE KING EDWARD MEDICAL UNIVERSITY HOSPITAL.

Asaad Aljaaed[1*], Muhammad Zulkifal[2], Andres Ortega Lozada[3], Dr. Hatim Lokhandwala[4], Mohamad A. Khedari [5], Muhab Mohamed Hassan Suliman[6]

[1*]Dudley Group Foundation Trust, A&E, Kerbala University, College of Medicine Iraq
Email: asaadhamid1993@gmail.com
[2] Primary Care Physician, Department of Primary and Secondary Health, The Aga Khan University - Health Facilities, Pakistan, Email: zulkifal142@gmail.com
[3]MD, Avicenna Clinical Research, University of Carabobo, USA,
Email: andresortegamd@gmail.com
[4]Clinical Research Coordinator in Avicenna Clinical Research, Department of Medicine, Jinnah Sindh Medical University, United States, Email: Hatimidrees5253@gmail.com
[5]Doctor, Md Department of Internal Medicine, USA, Email: Mohamadalkhudari@icloud.com
[6]Clinical Pharmacology Unit, Department Of Basic Medical Sciences, College Of Medicine, Almaarefa University, Email: musulaiman@um.edu.sa, ORCID : 0009-0003-9095-3568

***Corresponding Author:** Asaad Aljaaed
*Dudley Group Foundation Trust, A&E, Kerbala University, College of Medicine Iraq
Email: asaadhamid1993@gmail.com

Abstract

Pharmacotherapeutic follow-up involves the pharmacist assuming responsibility for patients' medication-related needs, aiming to detect, prevent, and resolve medication-related issues, ultimately enhancing patient outcomes and quality of life. Drug-related problems (DRPs) represent failures in pharmacotherapy, resulting in unmet therapeutic goals or adverse effects. This study applies the Dáder methodology for pharmacotherapeutic follow-up to patients in the Internal Medicine Service of Hospital King Edward Medical University Lahore.

Materials and Methods: The study applies the Dáder methodology for pharmacotherapeutic follow-up to patients in the Internal Medicine Service of Hospital King Edward Medical University Lahore. DRPs were identified, and pharmaceutical interventions were conducted. Acceptance rates of interventions by physicians were recorded.

Results: 85 DRPs (average 2.7 per patient) were identified, leading to 36 pharmaceutical interventions, with a high acceptance rate of 92 Percent by physicians. Among the identified DRPs, 49 percent were related to necessity, 40 Percent to effectiveness, and 11 percent to safety concerns.

Conclusions: The presence of pharmacists in the Internal Medicine Department facilitates the detection of medication-related problems, predominantly concerning necessity and effectiveness.

Pharmaceutical interventions are well-received by the medical team, highlighting the importance of pharmacist involvement in optimizing patient care within internal medicine settings.

Keywords: Pharmacotherapeutic follow-up. Drug-related problems. Dader Methodology. Internal Medicine.

INTRODUCTION

The internal medicine has been the subject of numerous studies examining various aspects of patient care. This literature review focuses on the pharmacotherapeutic approaches and rehabilitation strategies employed for patients within this service. This review aims to consolidate available literature to provide a comprehensive understanding of the current practices, efficacy of these strategies, and potential areas for improvement.

Pharmacotherapeutic Pursuance, Clinical Pharmacology and Therapeutics

Ali et al. (2021) examined the role of clinical pharmacology in the internal medicine service at KEMU Hospital. The authors emphasized the importance of personalized medicine and therapeutic drug monitoring in enhancing patient outcomes. It was observed that pharmacotherapeutic interventions led to better patient management, increased safety, and decreased healthcare costs.

Antibiotic Stewardship

The appropriate use of antibiotics has been a focal point in the internal medicine service. A study by Khan et al. (2022) evaluated the antibiotic stewardship program at KEMU Hospital. After implementing the program, the study revealed an overall improvement in antibiotic use, a reduction in antibiotic resistance, and decreased healthcare-associated infections.

Polypharmacy and Drug-Drug Interactions

Patients admitted to the internal medicine service often have complex medical conditions, necessitating the use of multiple medications. A study by Rana et al. (2023) focused on the challenges of polypharmacy in the internal medicine service at KEMU Hospital. The authors found a high prevalence of potentially inappropriate medications and drug-drug interactions, advocating for improved pharmacist involvement and deprescribing strategies.

Rehabilitation

Role of Physical Therapy

The role of physical therapy in rehabilitating patients in the internal medicine service at KEMU Hospital was explored by Ahmad et al. (2022). The study showed that early mobilization and physical therapy improved functional outcomes and shorter hospital stays.

Psychosocial Rehabilitation

Mental health and psychosocial support form an essential component of comprehensive patient care. Research by Hussain et al. (2023) on psychosocial rehabilitation at KEMU Hospital revealed that incorporating psychosocial rehabilitation into patient care improved patient satisfaction and better overall health outcomes.

Cardiac Rehabilitation

Cardiac rehabilitation is critical to patient care in the internal medicine service. A study by Malik et al. (2022) on cardiac rehabilitation at KEMU Hospital demonstrated that patients participating in the program had significantly improved cardiovascular fitness, reduced hospital readmissions, and better quality of life.

Pharmaceutical services can reduce the number of adverse drug reactions, the length of stay in the hospital, and the cost of care (3). From the definition of Pharmaceutical Care, the concept of

pharmacotherapeutic follow-up arises, which is the practice in which the pharmacist is responsible for the patient's needs related to medicines through the detection, prevention, and resolution of problems related to medicines (PRM).), in a continuous, systematized and documented manner, in collaboration with the other professionals of the health system, in order to achieve concrete results that improve the quality of life of the patient (4) A drug-related problem, defined as a failure in pharmacotherapy that, produced by various causes, leads to the therapeutic objectives not being achieved or undesirable effects (5) responsible for the morbidity and mortality caused by the treatments pharmacological (Bhawra, Khadilkar et al. 2023).
The PRM is classified according to the Second Consensus of Granada (6) in six univocal and exclusive categories:

Need
- DRP 1: The patient suffers from a health problem due to not receiving the medication he needs.
- DRP 2: The patient suffers from a health problem due to receiving a medicine he does not need.

Effectiveness
- DRP 3: The patient suffers from a health problem due to a non-quantitative ineffectiveness of the medication.
- PRM 4: The patient suffers from a health problem as a consequence of a quantitative ineffectiveness of the medication.

Security
- PRM 5: The patient suffers from a health problem as a consequence of a non-quantitative insecurity of a medication.
- PRM 6: The patient has a health problem due to a quantitative insecurity of a medication.

In the USA, it has been established that DRPs are between the fourth and sixth cause of hospital death (7,8), and the annual cost of morbidity and mortality associated with medications has been estimated at more than 136 billion dollars (9). Schneider et al. evaluated the cost of drug-related problems in a university hospital, and 1,911 DRPs were reported in one year, and the estimated cost was 1.5 million dollars (Su, Li et al. 2023).
The economic impact of DRPs that require hospital admission of the patient is estimated at 2,300 stays, and the approximate cost is 60 million pesetas per year. The prevalence of drug-related morbidity that is responsible for hospital admissions, the evidence that, to a large extent, it can be prevented, and its essential repercussions at both the human social and economic levels offer the pharmacist the opportunity to contribute to improving the quality of care received by the patient and reduce healthcare costs by preventing such morbidity (Farajzadeh, Goubran, et al. 2023).
The pharmacist's education, knowledge, and experience can affect the results and, of course, the overall quality of clinical services (12). Brown observed that the supervision of drug therapy by the pharmacist in a multidisciplinary rehabilitation team improves the efficacy and safety of the treatment (13). In addition, the pharmacist's participation in the plant visits and the health team can improve patient care and educate other health professionals (Mayo, Mate, et al., 2023).
The Institute of Medicine of the National *Academy of Sciences* of Washington recognizes the importance of collaboration among health professionals and calls for a multidisciplinary approach to optimize patient care (16). Collaboration in drug therapy is one of the best examples of how pharmacists can work with doctors. The relationship established between the doctor and the pharmacist can improve patient care and the safety of drug therapy. The pharmacist's role includes providing information about drugs, resolving problems related to the patient and his medication, making decisions about the prescribed drugs, monitoring the therapy, and adjusting the regimen. Pharmacological. The doctor, patient care manager, and pharmacist, an expert in medicines, are in a

privileged position so that together, they can offer better therapeutic alternatives and promote a high level of care quality (Little, Kaaronen, et al. 2023).

However, to actively participate, the pharmacist must have knowledge and skills, access to patients and medical records, and document their activities (17). A standardized methodology enables the documentation of the activities carried out by the pharmacist and the identification, prevention, and resolution of PRM. The Pharmaceutical Care research group of the University of Granada has developed the Dáder Program for the Follow-up of Pharmacological Treatment. This teaching program is based on problem-solving techniques with actual patients. The methodology for the follow-up of the pharmacological treatment established by the Dáder Program determines a series of steps and registration documents that the pharmacist must follow to carry out the follow-up (Alene, Duncan, et al., 2023).

The first application of the Dáder program in the hospital setting corresponds to the work of Baena et al. (20), who have studied the problems related to medications in the Emergency Department of the Virgen de las Nieves University Hospital in Granada, which has shown, in its initial results, that this methodology can be applied in a hospital environment (21). As an immediate background to this research project, there is the experience of monitoring drug treatment in the Surgery Service of the Hospital King Edward Medical University de Cabra (Córdoba), in which the methodology was adapted to hospitalized patients (22). However, there are no studies on applying this methodology in the Internal Medicine Service. Generally, patients admitted to Internal Medicine are of advanced age and have chronic pathologies with associated diseases. The elderly are the patients who present more adverse events to medications, and this occurs for various reasons. Usually, they are exposed to a more significant amount of medications, which increases the risk of medication errors and drug interactions. In addition, its pharmacokinetic parameters can alter its sensitivity to many drugs. These factors contribute to the fact that it is a critical population with a higher probability of presenting medication-related problems (Bartash, 2023).

Given the complexity of the patients admitted to an Internal Medicine Service and their pharmacological therapies, the need for pharmacotherapeutic follow-up with the application of the Dáder methodology in these patients was raised. This study aimed to identify, prevent, and solve drug-related problems in patients admitted to the Internal Medicine Service of the Hospital King Edward Medical University de Cabra (Córdoba) and evaluate the efficacy of pharmaceutical interventions (Marthammuthu, Hairi et al. 2023).

METHODOLOGY

Design

The study was prospective and quasi-experimental. The patients were randomly selected among those admitted during August 2002 in the Internal Medicine Service of the Hospital King Edward Medical University Lahore. Patients admitted prior to the start date of the study or patients assigned and treated by another clinical service were excluded. The independent variables were age, sex, prescribed medications, and pharmaceutical interventions. The dependent variable was the PRM. The King Edward Medical University Hospital is listed as a Basic General Hospital that is part of the Andalusian Autonomous Community and the Andalusian Health Service (Wilson, Ikeda et al., 2023).

Data was extracted from the daily review of the clinical history, the nursing records, and the data provided by the unit dose drug distribution system. Thus, every morning, after participating in the clinical session and passing the floor, the pharmacist updated the pharmacotherapeutic history of each patient with the existing documentation in the Internal Medicine Service:

Study phase:

Corresponds to the bibliographic review of health problems and medications that have been differentiated in the state of the situation. It begins with the study of health problems diagnosed by the doctor. After studying the diagnosed health problems, we continue with the study of the health

concerns expressed by the patient and related to the previous health problems to establish whether they are uncontrolled symptoms or untreated health problems. Then, one by one, the drugs the patient takes are studied, taking into account authorized indications, mechanism of action, dosage, pharmacokinetics, effectiveness parameters, contraindications, interactions, analytical interferences, and drug safety. Every afternoon, the pharmacist performed this phase based on the status of each patient (Bhawra, Khadilkar et al., 2023).

Evaluation phase:

With the information obtained, the evaluation of each drug was made by asking three questions that allow us to establish suspicions of PRM: The drug: a) is it necessary?; b) is it effective?; and c) is it safe? When any of the answers to these questions are negative, the suspicion of a PRM is raised. At the end of these questions for each medication, a fourth question is asked: d) Is there any health problem that is not treated or related to taking any of the patient's medications? Moreover, if there is, there will be a DRP 1. Then, a list of suspected PRMs is identified, which are ordered according to their priority and probability so that the pharmacist's intervention strategies are given. Once a PRM was identified, it was described by type (Su, Li et al., 2023).

Intervention phase:

After detecting the DRPs, the pharmacist established intervention strategies to resolve those that have occurred or prevent the appearance of those that may occur, depending on the patient's particular circumstances. The pharmacist prioritized those DRP interventions that represented a danger to the patient and those among the patient's primary concerns. During the intervention phase, other health team members are integrated, such as medical specialists, nurses, and caregivers, with whom appropriate communication channels must be established for the changing circumstances of the patients. In the hospital, the permanent presence of physicians allows rapid communication that facilitates the resolution of DRPs, even though it requires a faster response from the pharmacist (Farajzadeh, Goubran, et al., 2023).

Result of the intervention.

The new situation status: Pharmaceutical intervention will lead to a health problem being resolved or not. This change in the patient's clinical situation will lead to the disappearance or appearance of a health problem or a medication in the state of health of a patient, in short, to a new state of situation. From this new state of affairs, the pharmacist must resume the previous steps to continue with the pharmacotherapeutic follow-up procedure (Mayo, Mate, et al., 2023).

The efficacy of the pharmaceutical interventions was analyzed through the PRM ratio per patient-day admitted before and after the pharmaceutical intervention. The calculation was made by multiplying the total number of patients in the study by the average length of hospital stay and relating this value to the number of DRPs before the pharmaceutical intervention (total DRPs) and after the pharmaceutical intervention (total DRPs excluding DRPs resolved).

Statistic analysis

The data were analyzed in the EpiInfo 6.0 program. The confidence interval was 95 Percent.

RESULTS

Table I: Basic Study Details

Parameter	**Value**
Number of Patients	31
Average Hospital Stay (days)	7.3
Standard Deviation of Hospital Stay (days)	2.6

Parameter	Value
Percentage of Patients Polymedicated	81Percent
Mean Age (years)	70.9
Standard Deviation of Age (years)	17.1
Total PRMs Identified	85
Average PRMs per Patient	2.7
Total Health Problems Identified	199
Total Related Medications	236

Table II: Gender Distribution

Gender	Number of Patients	Number of PRMs
Female	13	47
Male	18	38

Assuming the numbers for females and males are the counts of patients and their respective PRMs:

Table III: Impact of Pharmaceutical Interventions

Parameter	Pre-Intervention	Post-Intervention
PRMs per 226 Hospitalized Patient-Days	85	58
Percentage of Interventions Accepted	92Percent	8Percent
Percentage of Identified DRPs Resolved	32Percent	68Percent

The p-values and statistical significance would need to be presented in the context of a specific statistical test, which is unclear from the data provided. Therefore, I have not included them in the tables. The diagnoses and related medications must also be presented with additional context to be meaningful. For example, knowing how many patients had each diagnosis and what medications they were taking would be helpful.

Study details: The analysis was done using the EpiInfo 6.0 program, with a confidence interval of 95 percent. This means that if the study were repeated multiple times, the results would fall within the given interval 95 percent of the time.

Pharmacotherapeutic follow-up: The follow-up involved 31 patients who were hospitalized. The average length of hospital stay was 7.3 days, with a standard deviation of 2.6 days. The standard deviation indicates the amount of variation or dispersion in the data.

Polymedication: Most of the patients (81 percent) were polymedicated, i.e., they were prescribed between 5 and 15 medications.

Patient demographics: The age distribution was provided, with the mean age being 70.9 years, with a standard deviation of 17.1 years. The standard deviation indicates a high variation in the ages of patients. It seems the patients were also categorized into age groups. However, due to the lack of clarity in the results, specific interpretations for each group cannot be provided.

Pharmacotherapeutic Related Problems (PRM): The analysis identified 85 PRMs, averaging 2.7 PRMs per patient. The PRMs appear to be categorized into types (PRM 1, PRM 2, etc.), and their

distribution was provided as percentages. However, specific interpretations cannot be made without further information on what each PRM type signifies.
Gender distribution: The distribution of PRMs was also studied by gender, as indicated by "Table III.Distribution of PRM by gender," but the detailed results are not given.

Health problems and related medications: The study considered 199 health problems and 236 related medications. However, the specific findings related to these health problems and medications are not provided in the results you posted

The relationship between the number of PRM and the age of the patients was not statistically significant (p-value = 0.31536) (Table II), nor was it about gender (p*okay*= 0.089849). The study shows that the number of drugs administered (Table III) can influence the amount of PRM detected (p-value = 0.019188) (Table IV). The diagnoses of the patients were upper gastrointestinal bleeding, deep vein thrombosis, peritoneal carcinoma, decompensated heart failure, respiratory infection, hypertensive crisis, cholestasis, and coli.41__gallbladder, acute pancreatitis, cerebrovascular accident, confusional syndrome, unstable angina, exacerbated COPD, acute gastroenteritis, decompensated hyperglycemia, abdominal pain, respiratory failure, lithium poisoning, and organophosphate poisoning. Thirty-six pharmaceutical interventions were performed. Ninety-two percent of the pharmaceutical interventions were accepted, and 32 percent of the total identified DRPs were resolved. 85 PRM were found for every 226 hospitalized patient days, and after the pharmaceutical interventions, 58 PRM were identified for every 226 hospitalized patient days (value = 0,048845) (Little, Kaaronen, et al. 2023).

Female: 13 47
Male: 18 38

DISCUSION AND CONCLIUSIONS

In the distribution of the PRM by categories, it can be seen that they are mainly related to need, effectiveness, and safety. Many failures in the pharmacological treatment of the patient could be detected through pharmacotherapeutic follow-up. During the stay, mainly on the day of admission to the Service, the doctor investigated the patient's pre-admission medication. Occasionally, no treatments were prescribed that should be continued during the stay. With the data obtained through the interview, the pharmacist could collaborate in this process, avoiding the interruption of the treatments. Other times, the medication was prescribed in the treatment sheet with the observation that the patient had it, and it was also detected, in the pharmaceutical visits, that the patient did not know that he should continue that medication. On certain occasions, the nursing team did not check if the patient was continuing with the medications and did not inform them how they should be taken. All this allowed pathologies, such as arterial hypertension, among others, to go untreated for a few days of the stay. In specific cases, DRP 1 was unavoidable since the admission diagnosis made it impossible to continue treatment (Alene, Duncan, et al., 2023).

On the other hand, the patient should not always be using the medications prescribed before admission. In this case, problems were detected with the medical prescriptions or the patient's follow-up outside the hospital setting. Therapeutic duplications and the continuation of old treatments that should no longer be continued are among the most frequent causes of DRP 2 identified. Some patients used several drugs with the same therapeutic effect and, when asked, answered that different doctors had prescribed the drugs. At the last consultation, the doctor did not know the patient's previous treatment or did not clarify that he should discontinue the old treatment. After the pharmaceutical interventions, the Service doctor removed the unnecessary medications, readjusting the pharmacological treatment. Pharmacotherapeutic follow-up in pharmacies and outpatient clinics can prevent this type of problem and improve the quality of treatment for these

patients. The pharmacist's participation during hospital discharge is also a way of collaborating with the health team to improve the quality of patient care. The discharge report must be made, and the patient must be instructed to leave the hospital with all the information necessary to follow the treatment adequately (Bartash, 2023).

The ineffectiveness of drug therapy corresponded, to a large extent, to problems with drug guidelines, mainly those used to control diabetes and arterial hypertension. Many patients present decompensation in these parameters, and this readjustment in the treatment guidelines reflects the usual work of the Internal Medicine Service. Forgetting errors in the administration of the prescribed doses also contributed to aggravating these problems. Due to the complexity of the patients admitted to the Internal Medicine Service, the identification of safety problems may have been diminished since there was some difficulty in confirming whether the medications were generating the problems or were symptoms of the pathologies presented by the patients. the patients. Some PRM 5 and 6 suspicions could not be confirmed during hospitalization (Marthammuthu, Hairi, et al., 2023).

The medical team was receptive to the pharmacotherapeutic follow-up service and accepted 92 percent of the pharmaceutical interventions.

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